AI Planning
Exercise Sheet 7

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Exercise 7.1

(a) $\Pi' = \{V, I, O, \gamma\}$ with

- $V = \{above\text{–}a, above\text{–}b, above\text{–}c, below\text{–}a, below\text{–}b, below\text{–}c\}$
  $\mathscr{D}_{above\text{–}\Upsilon} = \{A, B, C, n\} \setminus \{\Upsilon\}$
  $\mathscr{D}_{below\text{–}\Upsilon} = \{A, B, C, t\} \setminus \{\Upsilon\}$
  where $\Upsilon \in \{A, B, C\}$
- $I(a) = 1$ for $a \in \{below\text{–}b = t, above\text{–}b = A, above\text{–}a = n,$
  $below\text{–}c = t, above\text{–}c = n\}$
  $I(a) = 0$ else
- $O = \{move\text{–}X\text{–}Y\text{–}Z, move\text{–}X\text{–}Table\text{–}Z, move\text{–}X\text{–}Y\text{–}Table\}$
  $move\text{–}X\text{–}Y\text{–}Z = \langle (below\text{–}X = Y) \wedge (above\text{–}X = n) \wedge (above\text{–}Z = n),$
  $(above\text{–}Y := n) \wedge (below\text{–}X := Z)\rangle$
  $move\text{–}X\text{–}Table\text{–}Z = \langle (below\text{–}X = t) \wedge (above\text{–}X = n) \wedge (above\text{–}Z = n),$
  $(below\text{–}X := Z)\rangle$
  $move\text{–}X\text{–}Y\text{–}Table = \langle (below\text{–}X = Y) \wedge (above\text{–}X = n),$
  $(above\text{–}Y := n) \ \wedge (below\text{–}X := t)\rangle$
  for pair-wise distinct $X, Y, Z \in \{A, B, C\}$
- $\gamma = (above\text{–}c = B) \wedge (above\text{–}a = C)$

And the addition[1] that every $above|below[:]= \Upsilon$ with $\Upsilon \in \{A, B, C\}$ implies it's counterpart (e.g. $above\text{–}A[:]= B$ also tests/sets $below\text{–}B[:]= A$).

(b) $\Pi'' = \Pi$

(c)

[1] to make this a bit less verbose and better readable

Exercise 7.2

(a) Basic approach: since both h_1 and h_2 include the blank tile, $h_1 + h_2$ is not admissible.

(b) Basic approach: since for all tiles t_i it holds that $t_i \in h_3$ iff $t_i \notin h_4$ and vice verca *and* both h_3 and h_4 do *not* include the blank tile, $h_3 + h_4$ is admissible.